

**Abstract**

A fully integrated single-loop frequency synthesizer, which can serve as a local oscillator for a broadband tuner, is disclosed, thus allowing the creation of a single-chip solution for broadband applications. The tank circuits are integrated into the tuner chip through the combination of a phase-locked loop and multiple on-chip VCOs comprising narrow-tuning range varactors. Drift in the VCOs caused by heat is overcome by designing the VCOs to overlap each other. Initial tolerance problems associated with the VCOs are overcome by the use of a calibration method. The calibration of the VCOs is accomplished by utilizing the lock detect output of the phase-locked loop and a binary search algorithm. The edges of each VCO are determined with this calibration method, thereby enabling VCO selection based on the desired channel. A sufficient number of VCOs are provided such that whatever the initial tolerance shift, the full broadband spectrum can still be covered after calibration. Additionally, the problem of coupling between the local oscillator signal and the incoming radio frequency signal is mediated by the use of a programmable 2/4 divider. This 2/4 divider also provides additional flexibility in choosing the number of VCOs to put on the chip and which VCO to use in a particular implementation.